



UNITED STATES AIR FORCE
INSTALLATION RESTORATION PROGRAM

DECISION DOCUMENT

JP-4 TANK, WEST POL AREA
(SITE ST02)

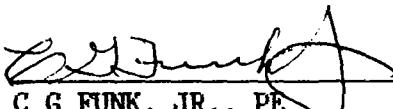
O'HARE AIR RESERVE FORCES FACILITY, IL

APRIL 1991

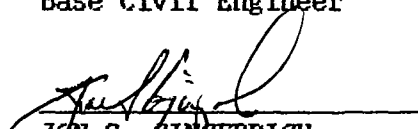
PREPARED BY
ENVIRONMENTAL PLANNING DIVISION
HEADQUARTERS, U.S. AIR FORCE RESERVE
ROBINS AIR FORCE BASE, GEORGIA 31098-6001

U.S. AIR FORCE
INSTALLATION RESTORATION PROGRAM
DECISION DOCUMENTS
JP-4 TANK / WEST POL AREA (SITE ST02)

APPROVING OFFICIALS:


C G FUNK, JR., PE
Base Civil Engineer

5-22-91
DATE


JON S. GIGGERRICH
Commander

5-22-91
DATE

INTRODUCTION

The objective of this decision document is to describe the setting, present the technical findings of past studies, evaluate potential remedial alternatives, and ultimately document the Air Force Reserve (AFRES) position on the final status of the JP-4 Tank, West POL (Petroleum-Oil-Lubricant) Area, Site ST02, at the O'Hare Air Reserve Forces Facility (ARFF), Illinois.

SITE IDENTIFICATION

O'Hare IAP is located in the Chicago metropolitan area in northeastern Illinois. The ARFF is located in the northeastern portion of O'Hare IAP directly south of Willow Creek (see Figure 1). The site described in this decision document consists of the JP-4 Tank, West POL Area located in the western part of the installation adjacent to O'Hare International Airport runways (see Figure 2).

BACKGROUND

Site Description

The JP-4 Tank, West POL facility (location of the JP-4 Tank, West POL Area site) began operations in 1951 and is currently not in use. The facility consists of one diked 210,000 gallon above-ground bulk storage tank, two 50,000 underground storage tanks, a pump house, and a jet fuel hydrant system (see Figure 3). In January 1972, a mechanical failure caused the release of approximately 82,000 gallons of JP-4 (a grade of jet fuel) into the diked area surrounding the bulk storage tank. The base spill response team recovered 40,000 gallons and the remaining 42,000 gallons either evaporated or infiltrated into the ground.

Construction on a new refueling truck staging area will begin mid-1991 on this site. The scope of this construction project includes the removal of fuel-contaminated soil within normal construction limits. Planned excavation activities during this construction project include removing the top two feet of soil for construction of a truck parking lot over about sixty percent of the site, excavating eight-foot-deep trenches directly beneath the staging area to install a network of storm-water drainage pipes, and excavating an eleven-foot pit to removed two 50,000 gallon tanks (see Figure 4 for location of tank truck staging area).

Previous Investigations

An IRP Records Search (Engineering-Science, 1983) for O'Hare ARFF was initiated for the purpose of identifying potential environmental damage from past waste storage and disposal practices, and to assess contamination migration potential at identified sites. JP-4 Tank, West POL Area and ten other sites were initially identified in this report, evaluated for environmental threat potential, and recommended for additional study.

An IRP Phase II Stage 1 Confirmation/ Quantification study (Dames & Moore, 1986) was initiated to confirm or deny the presence and/or migration of contaminants at sites previously identified in the Records Search (Engineering-Science, 1983). The scope of investigations at JP-4 Tank, West POL Area consisted of collecting three soil samples from one shallow soil boring.

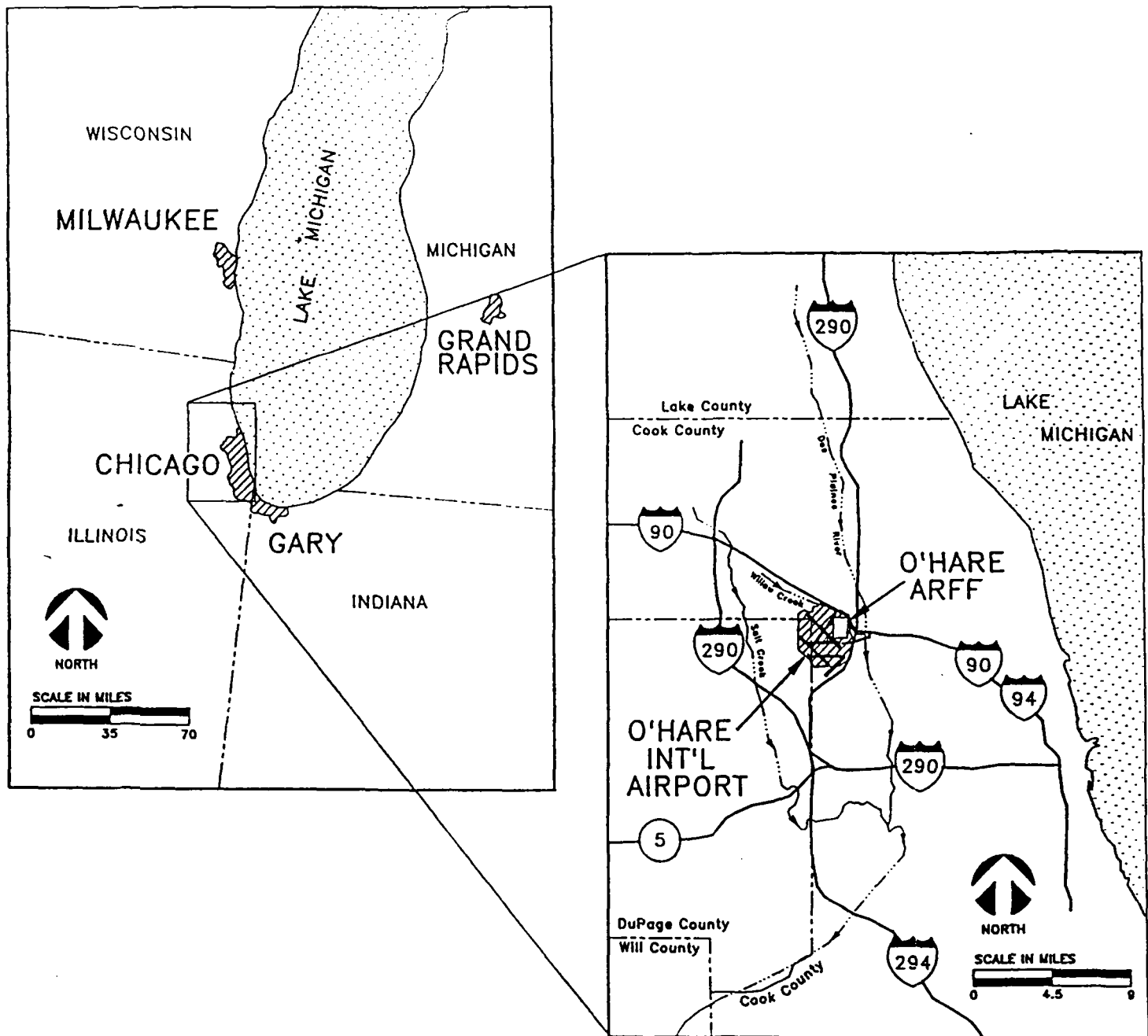


FIGURE 1, LOCATION OF O'HARE ARFF

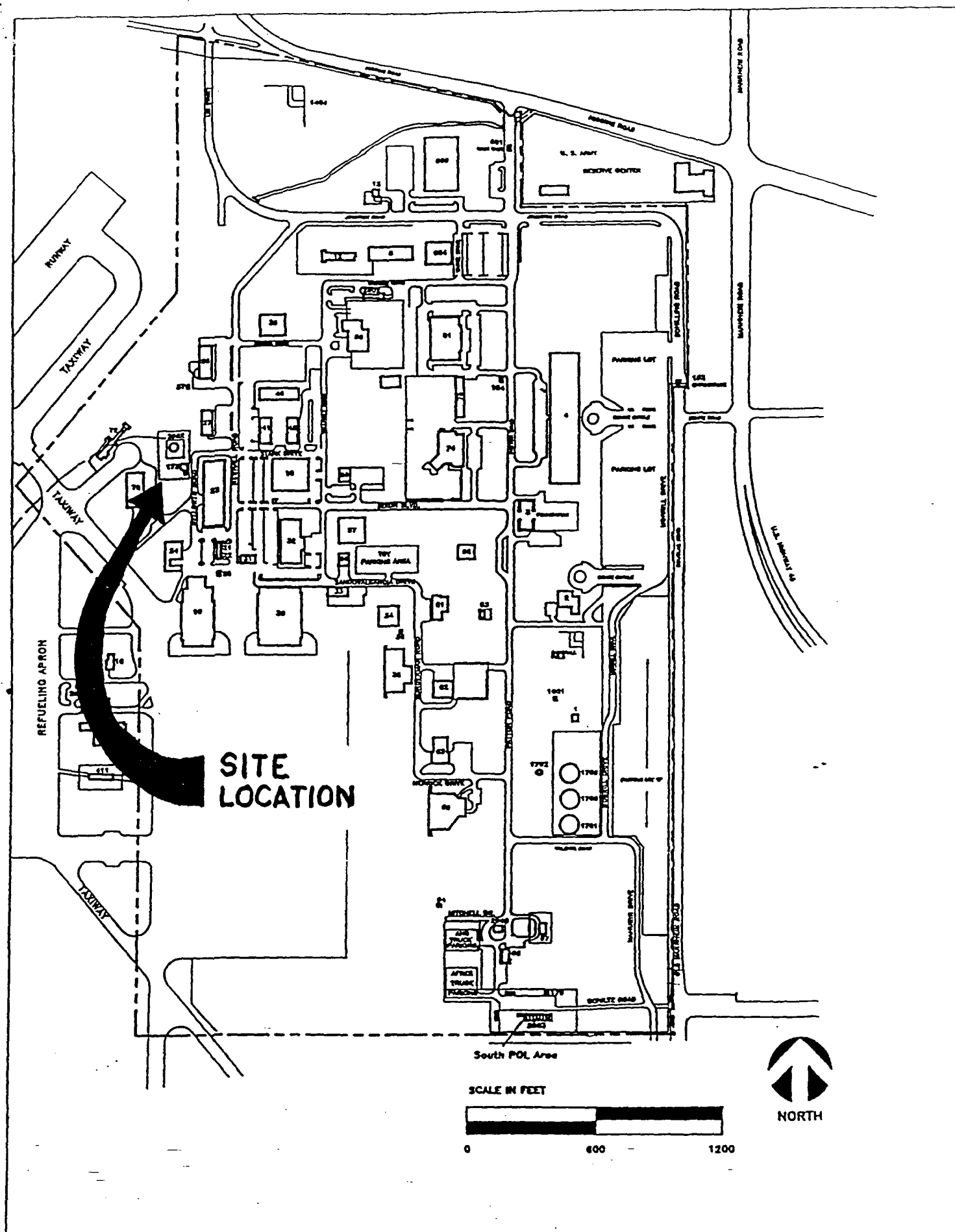


FIGURE 2, WEST POL AREA SITE LOCATION MAP

FIGURE 3, WEST POL AREA

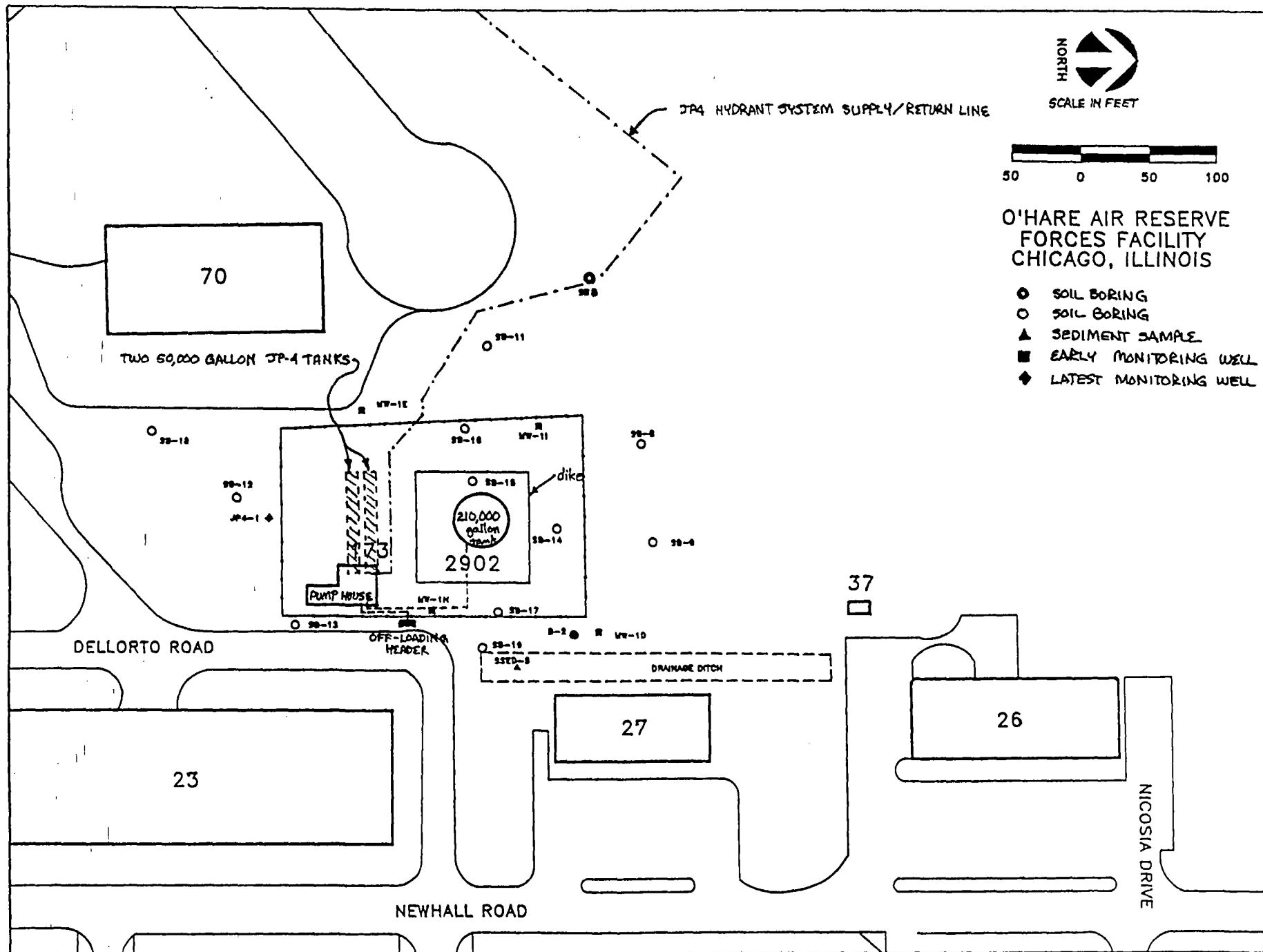
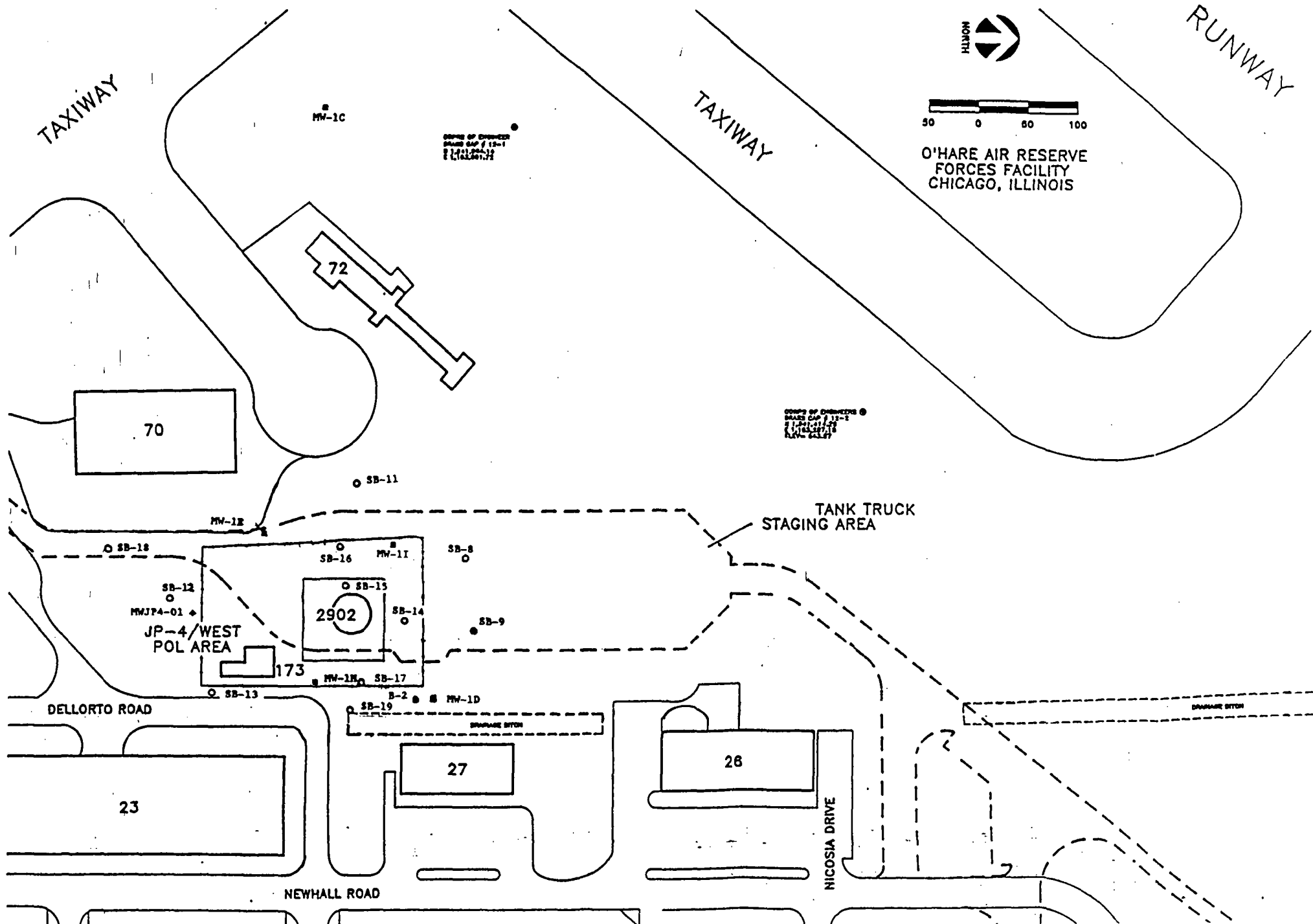


FIGURE 4, FUTURE TANK TRUCK STAGING AREA



In 1986, Roy F. Weston Inc. completed an Environmental Assessment (EA) for a proposed land exchange between the City of Chicago and Department of Defense. The objective of this assessment was to evaluate the environmental impact from contamination to the City of Chicago's planned municipal development on three parcels of land. Roy F. Weston Inc. conducted a historical review of existing documentation and performed analytical fieldwork. Fieldwork performed at JP-4 Tank, West POL Area consisted of the drilling and sampling of one soil boring, converting the soil boring into a monitoring well, and sampling the monitoring well.

An IRP Phase II Stage 2 Confirmation/ Quantification study (Roy F. Weston Inc., 1988) was initiated to evaluate the nature, extent, and possible impact from confirmed contamination at several sites previously identified by the Dames & Moore study. The scope of investigation at the JP-4 Tank, West POL Area consisted of drilling and sampling of twelve soil borings and the installation and sampling of four monitoring wells.

An IRP Remedial Investigation/ Feasibility Study (RI/FS) (Chem-Nuclear Geotech Inc., 1991) was initiated to evaluate the vertical and horizontal extent of contamination, determine health risks, and make recommendations on remedial action alternatives at several sites. The scope of investigation at JP-4 Tank, West POL Area consisted of collecting five soil samples from one shallow soil boring, the installation of one monitoring well, and two rounds of sampling from five monitoring wells.

ENVIRONMENTAL SETTING

O'Hare ARFF is located in the Eastern Lake Section of the Glaciated Central Lowlands physiographic province approximately 12 miles west of Lake Michigan. The topography of the base is relatively flat with ground surface elevations ranging from 635 to 650 feet above mean sea level.

Between 1958 and 1981, O'Hare ARFF received an average annual precipitation of 34.2 inches (35.4 inches of snow not included) and net precipitation of 4.2 inches. Monthly average temperatures during this period ranged from 20°F in January to 73°F in July. The one-year, twenty-four-hour rainfall event on record is 2.4 inches.

The predominant bedrock at O'Hare ARFF is about 80 feet below land surface and consists of the highly fractured and jointed Silurian dolomites of the Niagara Dolomite Formation. This dolomite is directly underlain by the competent Ordovician Maquoketa Shale Formation and directly overlain by Quaternary soils comprised of clay, sand, and gravel. The lithologic units encountered beneath Maquoketa Shale consist of alternating formations of dolomite, sandstone, and shale underlain by a basement of Precambrian crystalline rocks. The Cambrian, Ordovician, and Silurian strata dip slightly eastward toward Lake Michigan.

Groundwater beneath the facility occurs both within the unconsolidated surficial deposits and underlain bedrock formations. The unconsolidated Quaternary deposits contain several aquifer systems (15-75 feet deep) which are hydrologically connected in varying degree to the Silurian dolomite aquifer (75-210 feet deep), all of which contain groundwater with a naturally high concentration of total dissolved solids and metals over secondary drinking water standards. Two hundred and thirty feet of impermeable shale separate the Silurian dolomite aquifer from the next major aquifer system, the Ordovician-Cambrian aquifer. No industrial or drinking water wells are located in Silurian aquifer within a three-mile radius of the site.

Surface water runoff from the base is collected through a series of manmade ditches, culverts, and storm sewers which outfall into Willow Creek east of the base. This stream flows into the Des Plaines River approximately 1.5 miles east of the base. The Des Plaines River is a major drainage system in the area and is in the Mississippi watershed.

RESULTS AND SIGNIFICANCE OF PREVIOUS INVESTIGATIONS

Results and Significance of Soil Sampling

In 1985, Dames & Moore installed one 22-foot-deep soil boring (B-2) at the JP-4 Tank, West POL Area (Fig 3). Samples were taken at depths of 5, 7.5, and 10 feet. Soils sampled and analyzed for oil/grease and total lead. Analysis of soil samples revealed oil/grease (7 mg/kg) in one sample just above the detection limit (5 mg/kg).

In 1987, Roy F. Weston installed twelve soil borings and four groundwater monitoring wells (see figure 3). Soils from the borings and monitoring well borings were collected and analyzed for hydrocarbon content by infrared scan. The Total Petroleum Hydrocarbon (TPH) concentration in the soil varied with depth, concentrations in the 0 to 5 foot interval ranged between undetected and 486 mg/kg (see figure 5), concentrations in the 5 to 10 foot interval ranged between undetected and 132 mg/kg, and concentrations in the 10 to 15 foot interval ranged between undetected and 37 mg/kg. One soil sample (SB-15) in the 0 to 5 foot interval detected a TPH concentration of 80 mg/kg and 3000 mg/kg in the duplicate sample. Due to the statistical variance, both results were eliminated from the validated data set. Based on the TPH concentrations and the size of the original spill, Roy F. Weston concluded that between 1972 and 1985, 95 percent of the spill volume had volatilized and/or undergone biodegradation.

In 1989, Chem-Nuclear Geotech Inc. installed one soil boring and completed it as a groundwater monitoring well (JP4-01). Five soil samples were collected from the boring and were analyzed for benzene, ethylbenzene, toluene, xylenes (BETX), total metals, and EP Toxicity metals. No metals were detected above background concentrations. Only xylenes were detected in the BETX soil scan at levels less than 8 ppm (the Illinois-recommended cleanup level is 25 ppm total for ethylbenzene, toluene, and xylenes). Chem-Nuclear Geotech did conversion calculations for BETX content based on TPH data from the Roy F. Weston study (1986) which revealed that ethylbenzene, toluene, and xylene concentrations were below the Illinois-recommended cleanup level. The conversion calculation assumes no volatilization or biodegradation of the BETX fraction occurred for 23 years. Comparison with calculated BETX data and actual data collected by Chem-Nuclear Geotech Inc. indicates that volatilization, solubilization, and/or biodegradation has further reduced the concentration of low molecular weight hydrocarbons since the last study. The baseline Risk Assessment for this site states that cancer risks from soil exposure at this site are far below EPA's action level and there are no pathway-specific receptors at risk.

Results and Significance of Groundwater Sampling

In 1987, Roy F. Weston installed four groundwater monitoring wells (previously identified). These wells are screened in the upper unconsolidated sediments at the site. Groundwater samples were collected and analyzed (two rounds) for halogenated and aromatic volatile organics, BNA organics, metals (unfiltered), petroleum hydrocarbons, and other field parameters. Analytical results

revealed that only two chemical species, cadmium (20 ug/l) and chromium (142 ug/l), exceeded Illinois Water Pollution Control Rules (IWPCR) of 10 ug/l and 50 ug/l respectively, however these unfiltered metal samples are attributed to natural soil conditions and do not originate from jet fuels (comprised of organics only). Analysis of the background well (MW-1C) showed 29 ug/l for cadmium and 107 ug/l for chromium.

In 1989, Chem-Nuclear Geotech Inc. installed one groundwater monitoring well (JP4-01) screened in the upper unconsolidated sediments to complement existing data. Groundwater samples were collected from all five site wells and analyzed for BETX, total and dissolved metals, and other field parameters. Dissolved levels of iron (7300 ug/l) and manganese (1140 ug/l) were above IWPCR levels (1000 ug/l, and 50 ug/l respectively), however these species are attributed to natural soil conditions and do not originate from organic-based jet fuel. Analysis of the background well (MW-1C) showed 142 mg/l total iron and 2410 ug/l total manganese. Benzene (6.2 ug/l, well JP4-01) was the only organic detected at levels above the IWPCR drinking water standard (5.0 ug/l).

Results and Significance of the baseline Risk Assessment

In 1991, Chem-Nuclear Geotech Inc. completed the baseline Risk Assessment (RA) for this site. The RA determined that cancer risks from pathway-specific soil exposure at this site are conservatively 1×10^{-6} . This risk figure should be qualified since it is inclusive of exposure to the adjacent landfill and two other sites, and assumes a limitless reservoir of chemicals from all sites during the lifetime exposure scenario. The RA also concluded that cancer risks from groundwater at this site (9×10^{-21}) are far below EPA's action level range (1×10^{-4} to 1×10^{-6}), and that there are no pathway-specific groundwater receptors at risk. Chem-Nuclear Geotech concluded that the JP-4 Tank, West POL Area posed no threat to the health or safety of occupational exposed workers at the site.

Significance of Planned Construction Activities

Planned earth moving activities during this project will allow visual confirmation of fuel residuals and the opportunity to segregate about sixty percent of the site's soil volume if tests indicate this measure is necessary. Any soil excavated within normal construction limits which exhibits the characteristics of fuel-contaminated soil will be segregated for analytical testing. Based on analytical results, the segregated stockpile will be treated or disposed of in accordance with state and federal regulations. Another positive aspect of the construction project is the sealed pavement of the parking area which will cover a majority of contaminated soil, severely limiting water infiltration and leachate development in the region of influence.

CONTAMINATION ASSESSMENT

Analytical results confirm that soils and groundwater at the JP-4 Tank, West POL Area contain residual petroleum hydrocarbons (TPH analyses) originating from the 1972 jet fuel spill. However, these same analytical results also confirm that the JP-4 Tank, West POL Area does not contain harmful levels of hydrocarbons of concern (BETX) or metals above background levels in the soil.

Benzene was the only organic compound detected slightly above drinking water standards during the investigative efforts. The RA estimated time for the groundwater to reach the nearest well (a USGS water quality well screened in the Silurian Dolomite aquifer) on the order of hundreds (990) to thousands (5430) of years (250 years was used in exposure calculations). Chem-Nuclear Geotech concluded that significant natural biodegradation and/or volatilization of the spill has substantially reduced BETX concentrations since the occurrence of the spill in 1972.

CONTROL MEASURES

Identification of Control Measures

The following alternative control measures were identified for consideration at the JP-4 Tank, West POL Area, Site ST02, O'Hare ARFF:

1. Excavate and dispose of contaminated soil
2. Treatment of contaminated soil
3. Treatment of contaminated groundwater
4. Long-term Monitoring
5. No Further Action

Screening of Control Measures

The control measures were screened to select a technically feasible and cost-effective plan to control the release of hazardous substances to the environment. The following criteria were used to screen each control measure:

1. Currently known characteristics of the site
2. Future construction activities at the site
3. Technical feasibility and effectiveness of the remedial action at the site.

Evaluation of Alternative Control Measures

Alternative 1: Excavation and Disposal of Contaminated Soil

This alternative was not chosen due to the low risk and minor contamination within the soils of the site. Future demolition and construction activities at the site will segregate and test site soils encountered during excavation which exhibit fuel-contaminated characteristics in full compliance with all applicable regulations and/or permit requirements. The scope of the facility project requires the removal of soil during demolition and construction which will further reduce the low risk at this site.

Alternative 2: Treatment of Contaminated Soil

This alternative was not chosen for two reasons: a) The low risk due to pathway-specific soil exposure at this site warrants no treatment. b) Soil will be removed which exhibits fuel contamination exceeding applicable regulations and/or permit requirements.

Alternative 3: Treatment of Contaminated Groundwater

This alternative was eliminated due to the extremely low risk (9×10^{-21}) as well as the absence of a technically feasible and cost effective method to treat the low benzene concentrations in the groundwater. Due to the extremely low soil permeability at this site, groundwater extraction technologies were eliminated in the Feasibility Study for the adjacent landfill due to their

ineffectiveness. The RA stated that benzene concentrations in the groundwater will naturally biodegrade and attenuate to levels below the MCL long before any pathway-specific groundwater receptor is at risk. Analytical results from site soil samples consistently detected an absence of benzene indicating no current or future source for soluble benzene.

Alternative 4: Long-term Monitoring

This alternative was eliminated due to the extremely low groundwater pathways risk (9×10^{-21}), low concentrations of organics in monitoring wells, and the absence of benzene in the soil indicating no contamination source exists.

Alternative 5: No Further Action

This alternative was chosen due to the low overall risk, the minor fuel residuals remaining in site soils, the segregation of fuel contaminated soil during construction, the evidence of continued natural attenuation in soil and groundwater, and the refueler truck parking pavement which will cover a majority of remaining contaminated soil, preventing water infiltration and leachate development.

RECOMMENDATIONS

Based on analytical data, a baseline Risk Assessment, and the impact of future construction on this site, AFRES recommends that No Further Action be taken at the JP-4 Tank, West POL Area (Site ST02), O'Hare ARFF.

REFERENCES

Engineering-Science, 1983. Installation Restoration Program Phase 1 Records Search, O'Hare Air Reserve Forces Facility, Illinois, prepared for United States Air Force Reserve, Robins AFB, Georgia.

Dames & Moore, 1986. Installation Restoration Program Phase II - Confirmation/Quantification Stage 1, prepared for Headquarters Air Force Reserves Command Surgeon's Office, Bioenvironmental Engineering Division, Robins Air Force Base, Georgia.

Roy F. Weston, 1986. Environmental Assessment, Landfill No. 1, Landfill No. 2, and Fire Protection Training Area, prepared for O'Hare Associates, Chicago, Illinois.

Roy F. Weston, 1988. Installation Restoration Program Phase II - Confirmation/Quantification Stage 2, prepared for Headquarters Air Force Reserves Civil Engineering Office (HQ AFRES/DEPV), Robins Air Force Base, Georgia.

International Technology Corporation, 1990. Final Report, Baseline Risk Assessment, O'Hare Air Reserve Forces Facility, Chicago, Illinois, prepared for UNC Geotech, Grand Junction, Colorado.

Chem-Nuclear Geotech Inc., 1991. Remedial Investigation Report, prepared for 928th Tactical Airlift Group and 126th Air Refueling Wing at O'Hare Air Reserve Forces Facility, Chicago, Illinois.